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Title: 25 YEARS OF TECHNICAL ADVANCES IN RFQ
ACCELERATORS

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25 Years of Technical Advances in RFQ Accelerators

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The radio frequency quadrupole (RFQ) accelerator began as “The ion linear accelerator with space-uniform strong focusing” conceived by I. M. Kapchinskii and V. A. Teplyakove [Prib. Tekh. Eksp.No.2 (1970) p. 19]. In 1979, R. H. Stokes, K. R. Crandall, J. E. Stovall and D. A. Swenson [IEEE Trans. NS-26 (1979) p. 3469] gave this concept the name RFQ. And by 1983, at least 15 laboratories throughout the world were working on various RFQ designs. In the early years, there were many types of geometry considered for the RFQ, but only a few types have survived. The two cavity geometries now used in almost all RFQs are the 4-vane and 4-rod structures. The 4-vane structure is the most popular because its operating frequency range (80 to ~500 MHz) is suitable for light ions. Heavy ions require low frequencies (below 200 MHz). Because the 4-rod structure has smaller transverse dimensions than a 4-vane RFQ at the same frequency, the 4-rod RFQ is often preferred for these applications. This paper will describe how the RFQ accelerates and focuses the beam. The paper also discusses some of the important technical advances in designing and building RFQs.

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